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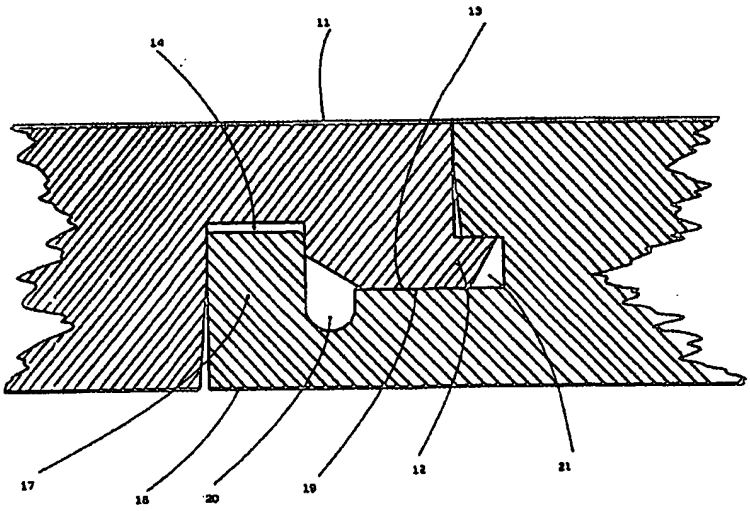
(54) Title: FLOOR COVERING CONSISTING OF FLOOR PANELS AND METHOD FOR THE ASSEMBLY THEREOF



(57) Abstract

Floor covering formed by panels constituted by boards of cellulose fibers of wood shavings bound with synthetic resins (MDF, HDF or faced chipboard). The corresponding longitudinal edges of two contiguous panels (10) are coupled by overlapping each other according to horizontal planes (13, 19; 31, 35) and engage each other by means of a double-hook engagement (14, 17; 33, 36) according to vertical planes, so as to form a loose joint that is capable of self-levelling and self-stabilizing under load conditions (F), with the edges being capable of longitudinally sliding with respect to each other. The solution enables supplementary materials, fittings and tools for assembling and disassembling the panels to be eliminated, thereby making it possible for the same panels to be reused.

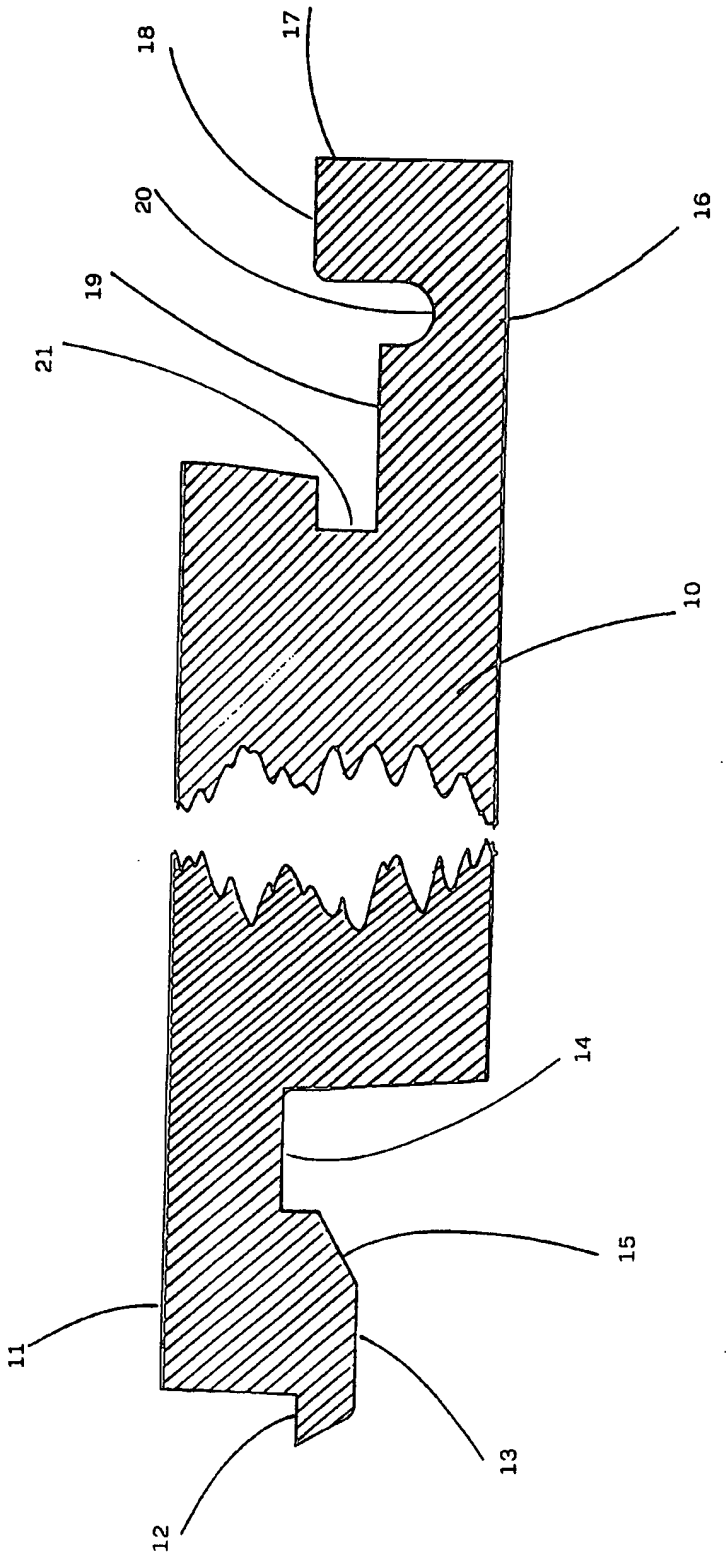


FIG.1

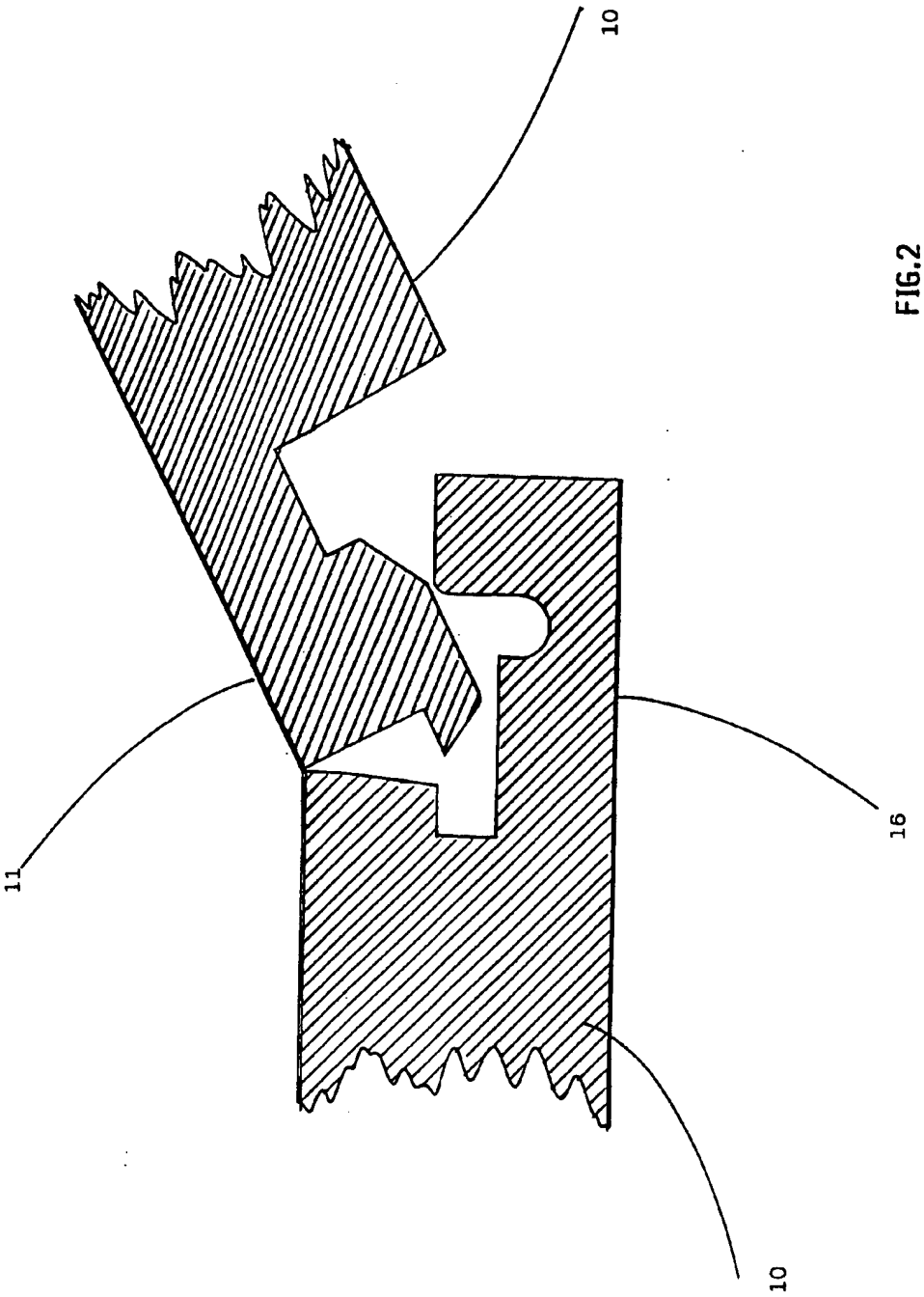


FIG.2

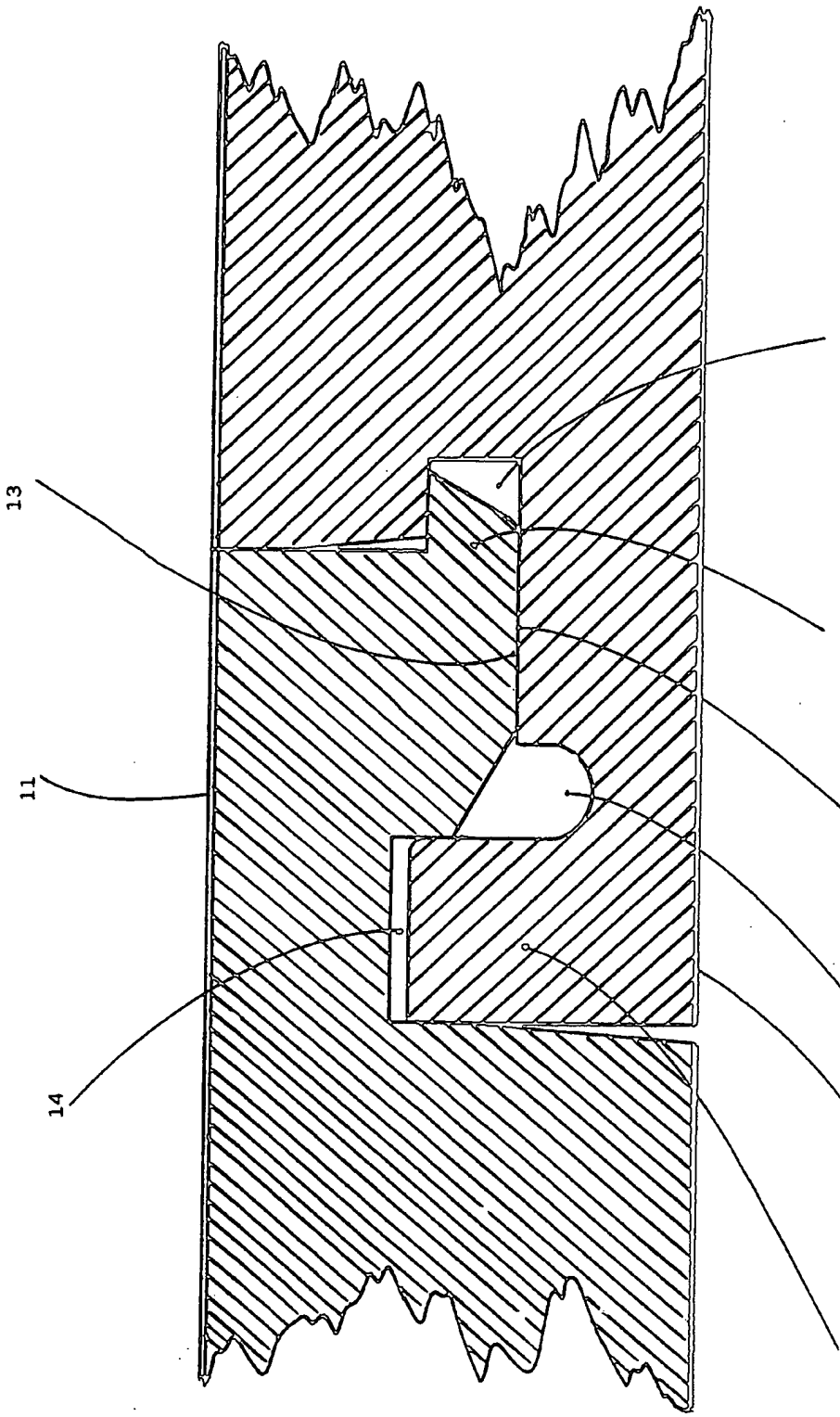


FIG.3

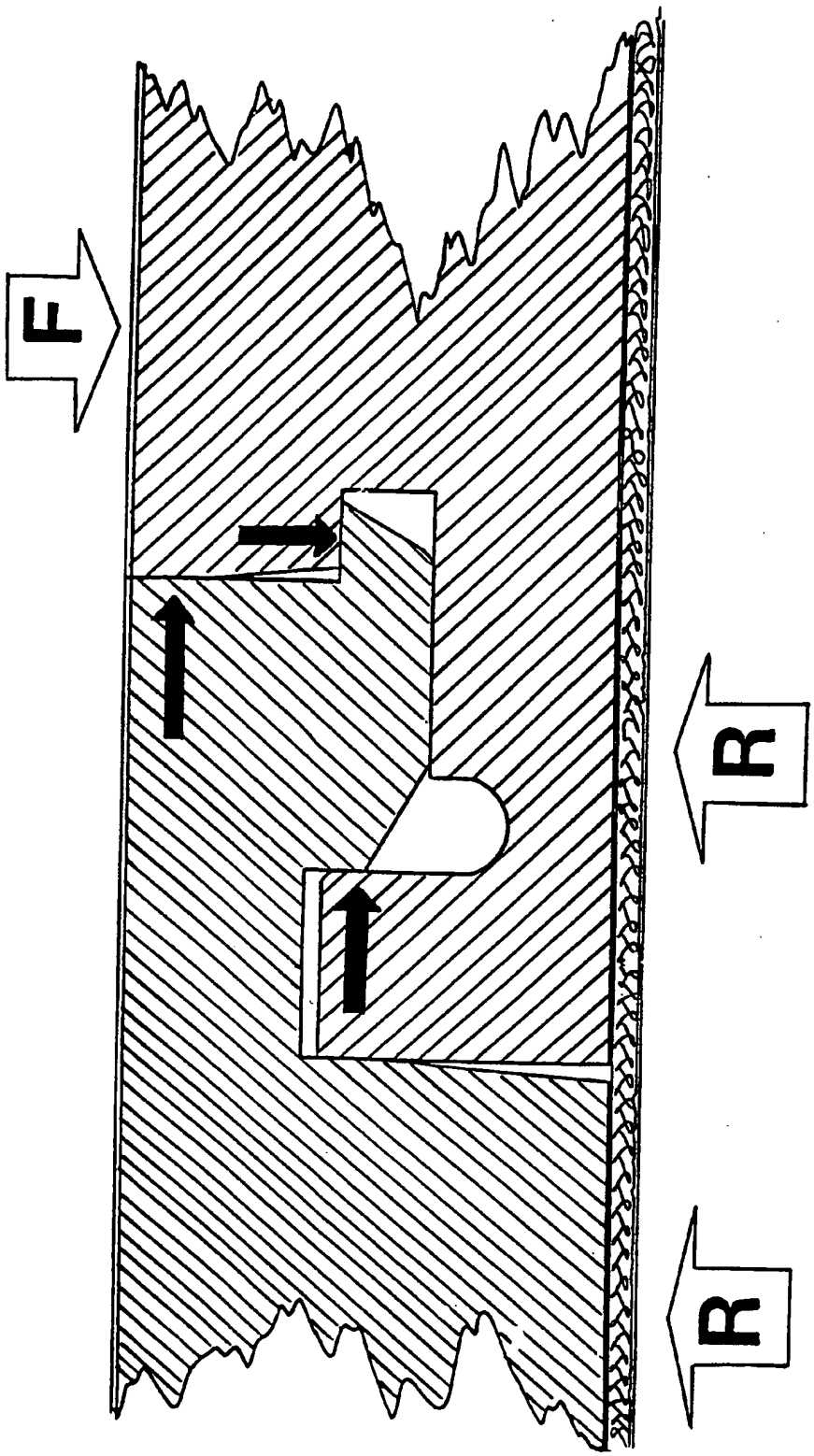


FIG.4

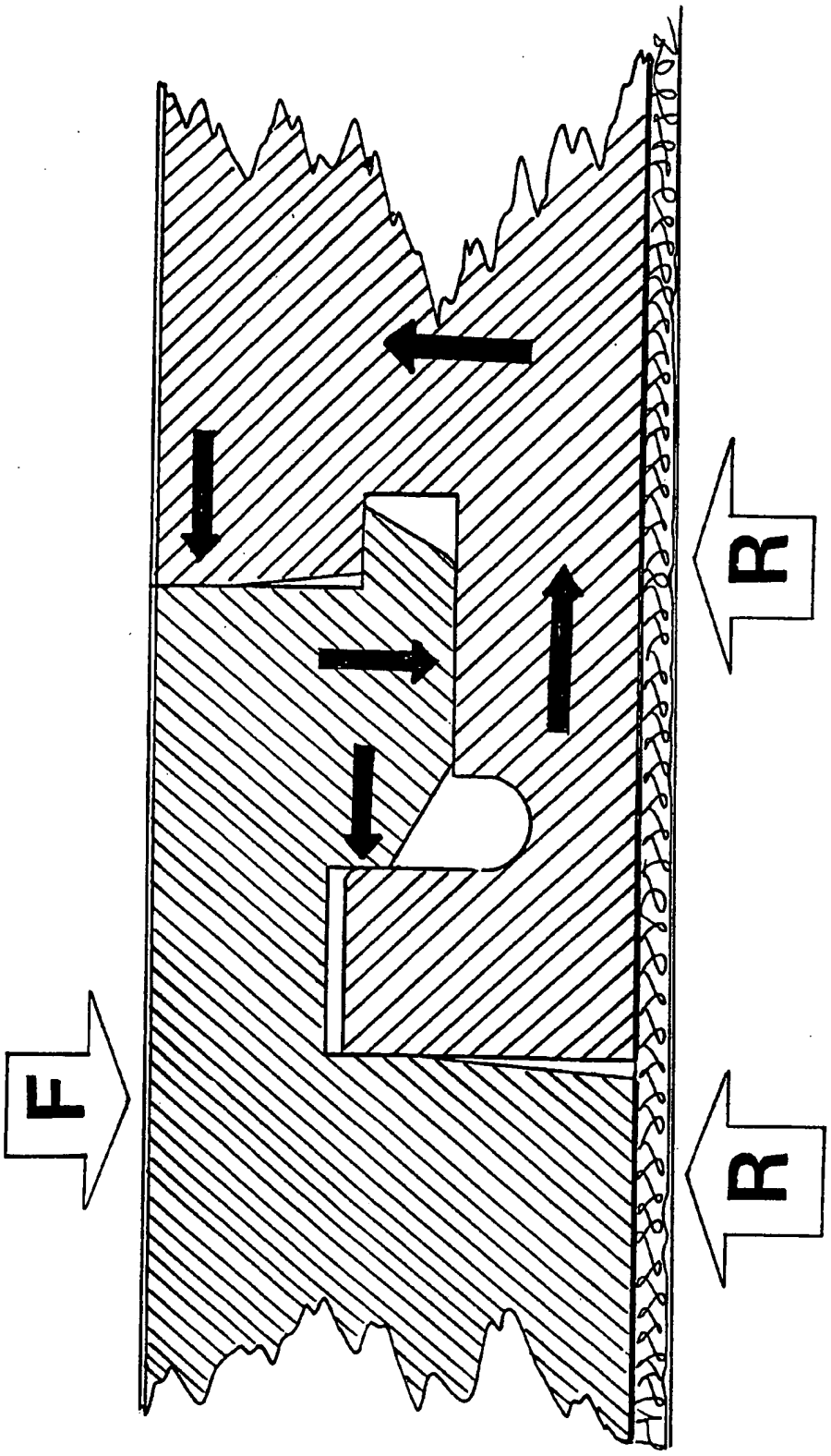


FIG.5

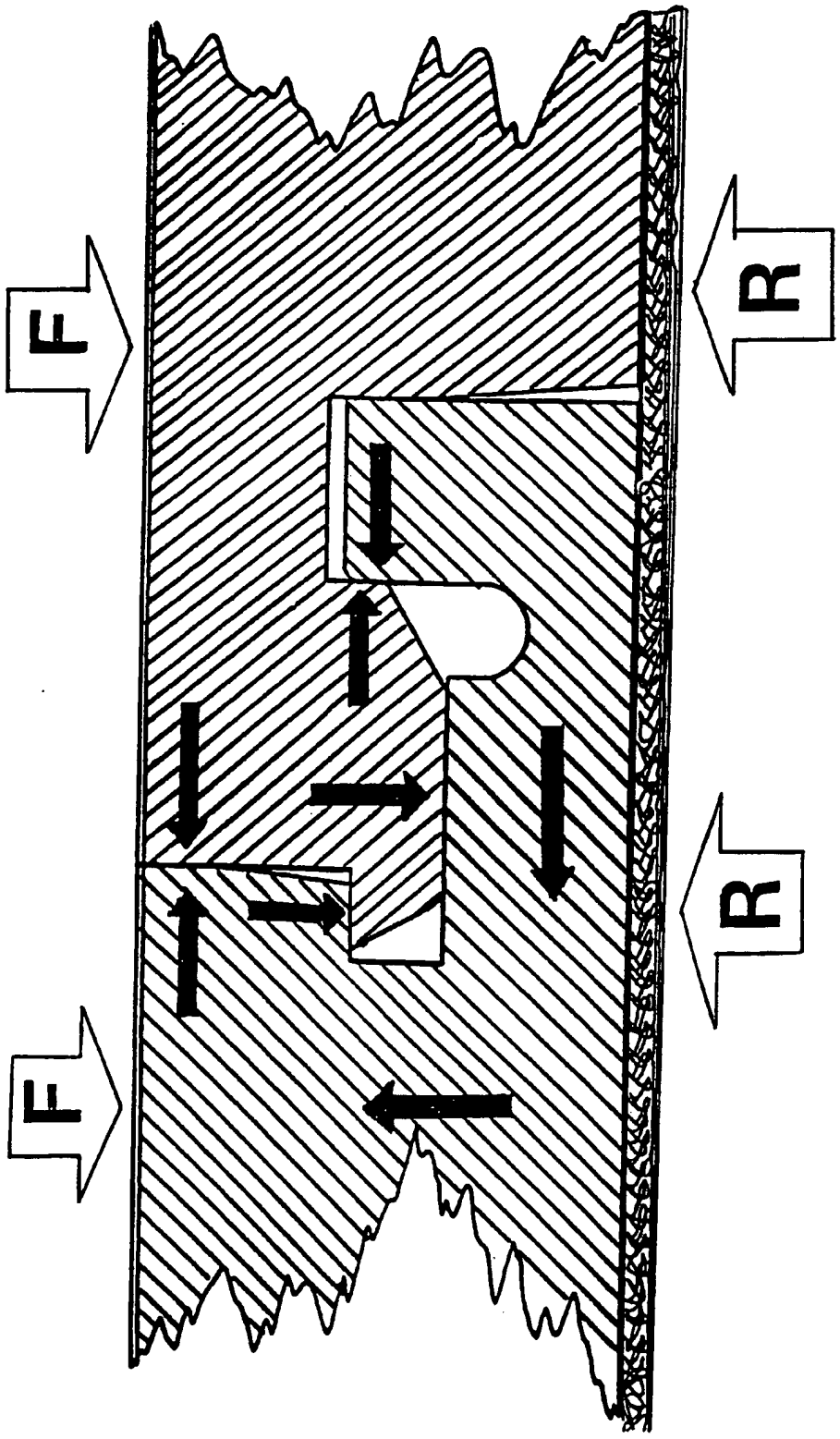


FIG.6

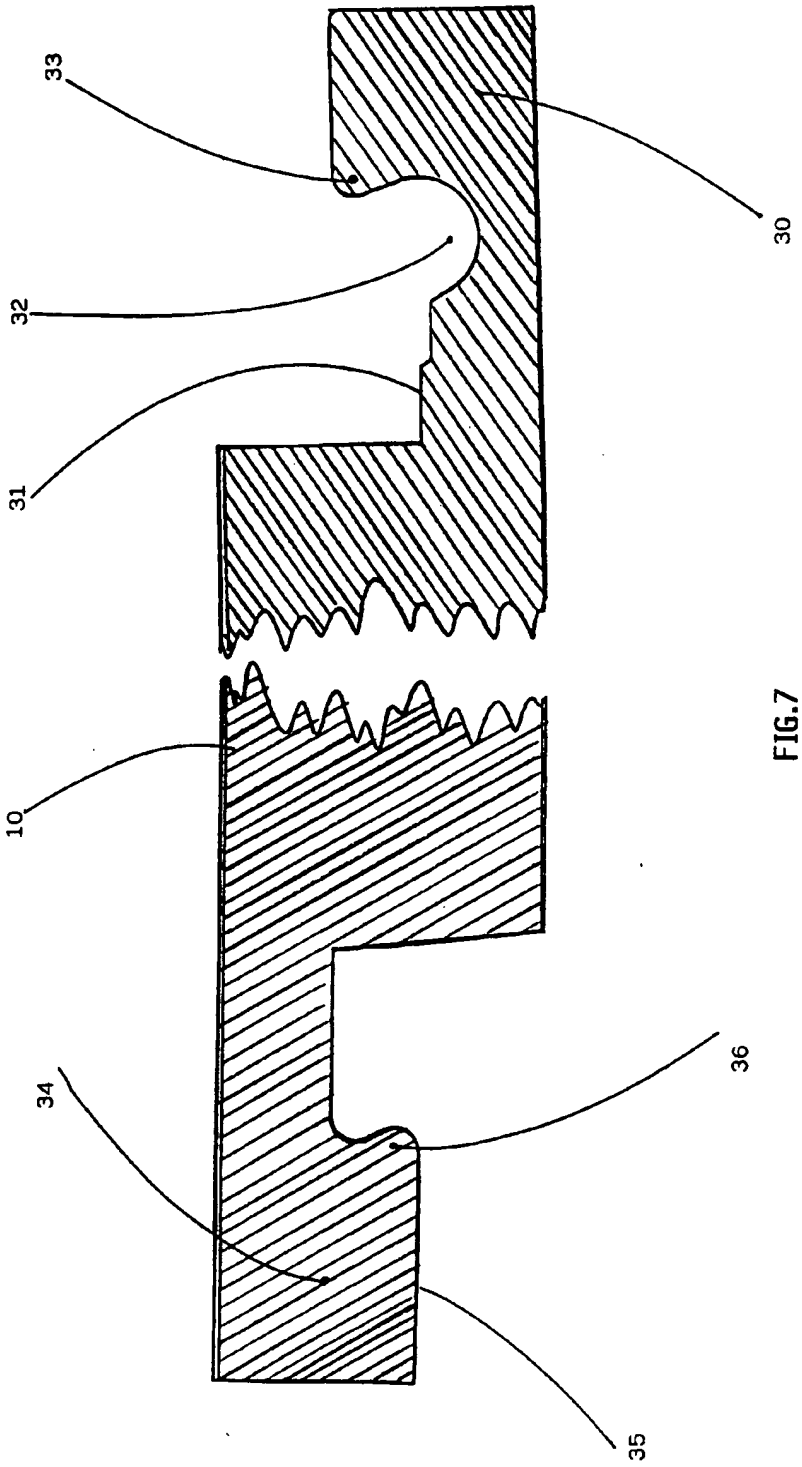


FIG.7

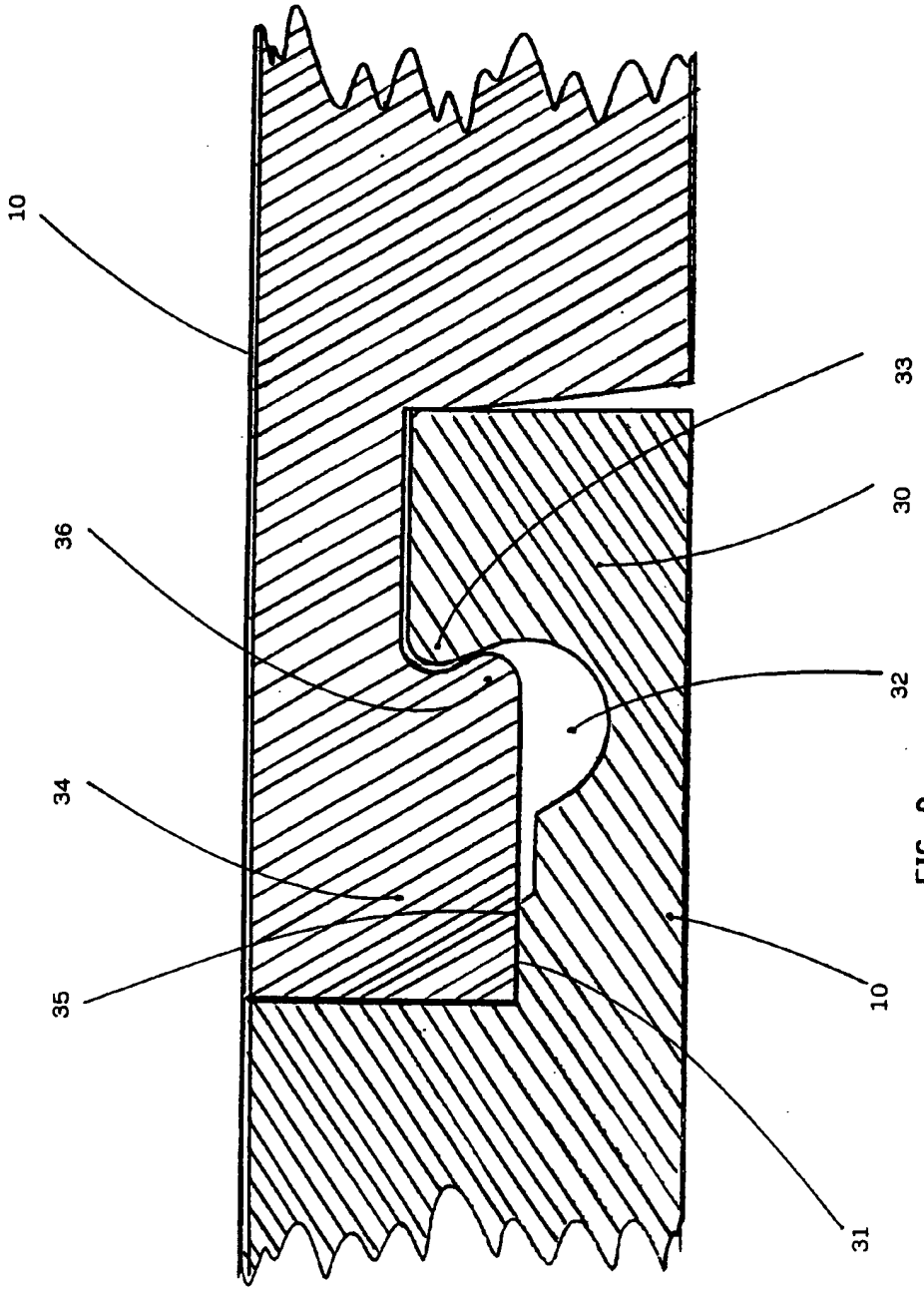


FIG. 8

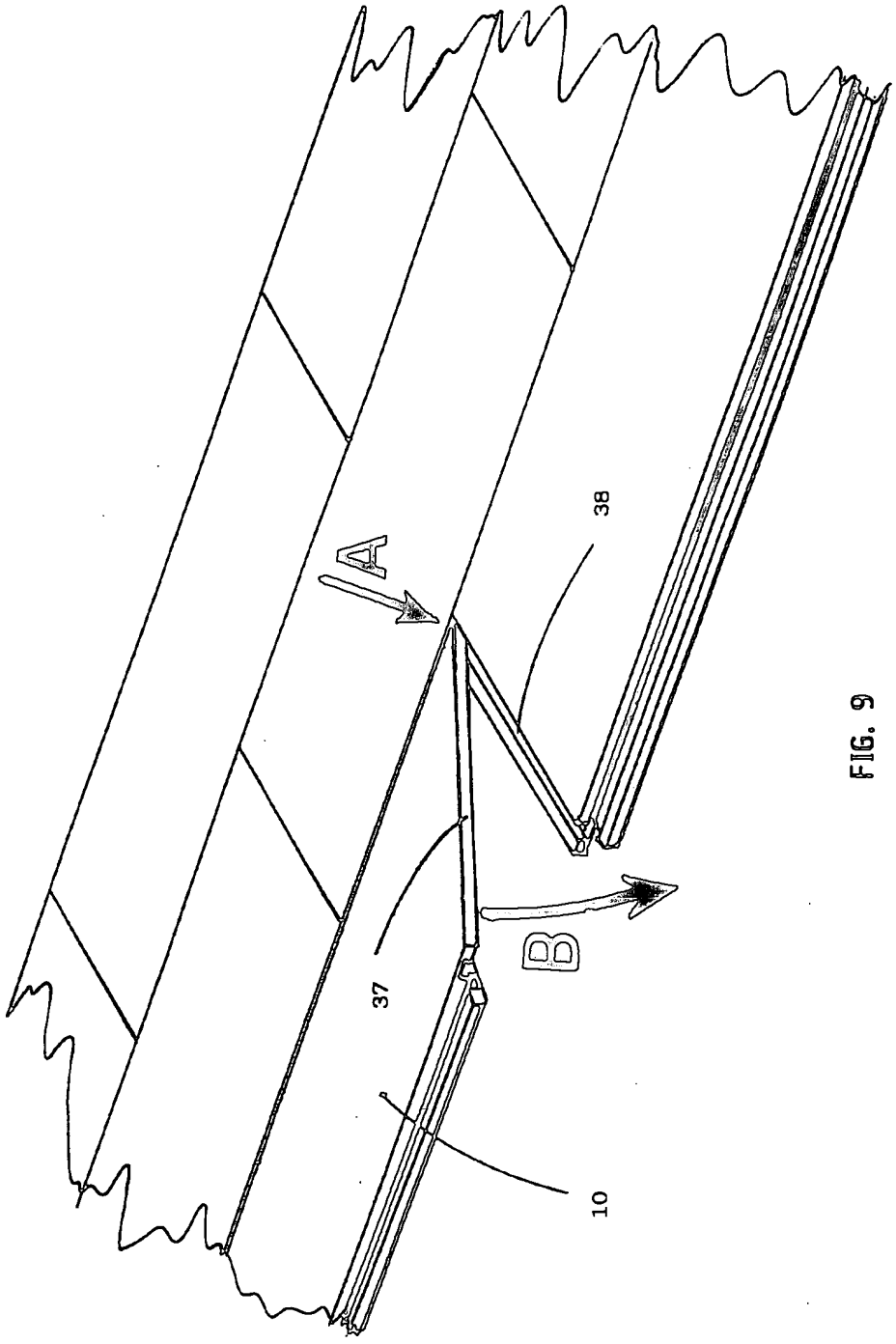


FIG. 9

FLOOR COVERING CONSISTING OF FLOOR PANELS AND METHOD FOR THE ASSEMBLY THEREOF

DESCRIPTION

The present invention refers to a floor covering formed by panels constituted by boards of cellulose fibers or wood shavings bound with synthetic resins, generally known in the art as MDF (Medium Density Fiberboards), HDF (High Density Fiberboards) and faced chipboards, as well as a method for the assembly thereof.

Floor coverings of the above cited kind are known since a long time now, while a number of different solutions have been proposed to keep the panels joined to each other.

In a first example, the edges of the panels are profiled so as to bring about tongue-and-groove joints between contiguous panels. In order to prevent assembled panels from possibly separating from each other, thereby creating unwanted gaps or clearances, additional measures are quite often taken such as glueing the edges or using metal or plastic interconnecting profiles.

In an improved example, the edges of the panels have profiles that are so shaped as to feature snap-fit joining elements, in such a manner as to do away with the need for additional components or materials to be used for strengthening the joints. This solution, which is described in WO 94/1628, WO 96/27719 and WO 96/27721, is however not effective in ensuring an adequate and firm stability along all sides of the panels.

A solution has been proposed more recently (WO 97/47834) in which the edges of the panels are provided with mutually engaging elements in the form of tongues and grooves, which are provided with mechanical locking means adapted to prevent the edges from possibly separating from each other. These locking means are provided integrally with the related panel and the coupling is brought about laterally along the edges by just snap-fitting and/or rotating them into fastening. The locking means are represented by inclined-plane profiles that are forced elastically into coupling. The preferred inclination of the coupling surfaces is indicated to lie anywhere between 30° and 70° with respect to the horizontal plane. The contours of the edges of such panels appear to be rather complex, since the aim is to obtain the coupling along the longitudinal edges through a rotary movement and subsequent snap-fit engagement, while the butt joints are obtained directly by snap-fitting, preferably with the use of tools. In substance, it therefore ensues that, when the panels are so assembled, the locking means exert a tension that forces contiguous panels against each other.

Such a solution as disclosed in WO 97/47834 has a number of drawbacks. In the first place, since the coupling of the panels with each other is forced by means of a mechanical tension, the need arises for very solid, strong materials to be used in the construction of said panels, such as in particular high-density compressed fiberboards (HDF), to be further specially reinforced along their edges. Moreover, such a forced fitting brings about a certain extent of downward bending of the tongues of the panels that remain or are put under load. This has a twofold negative consequence, ie. (i) the need for an elastic support layer to be always provided under the floor covering in order to dimensionally absorb the deflection of the tongues in view of preventing them from breaking, and (ii) a constant possibility of fracture due to the strain to which the tongues are submitted along a horizontal plane in a central section of the panel in correspondence with the bottom of the groove. Such a possibility of the panels breaking along a central portion thereof arises still more easily when the panels are butt joined, ie. when use must be made of a wall abuttal wedge or a wooden block, driven with an appropriate tool such as a hammer, in order to bring about the forced coupling. Of course, owing to the surface tensioning of the panels due to the melamine layers of the surfaces, any

rupture within the same panels woulf unfailingly cause the edge thereof to raise with respect to the plane of the floor, with negative consequences not only from an aesthetical point of view, but also in connection with arising risks of stumbling and the weardown of the upper surface of the so exposed edge. Finally, a floor covering in which the panels are kept joined to each other by forced snap-fit coupling and under constant tension, cannot be disassembled to modification or repair purposes without incurring the risk of seriously damaging it.

It therefore is a main purpose of the present invention to provide a floor covering made of MDF, HDF or faced-chipboard panels which is more rational as far as both the construction of the panels and the assembly thereof are concerned, since the panels are provided with simple, tensionless coupling means that enable the same panels to slide both longitudinally and along their butt joints relative to each other. The floor covering according to the present invention therefore allows for materials without any particular solidity characteristics to be used in manufacturing said panels, as well as for the use of any kind of tools whatsoever to be done away when assembling and disassembling the same floor covering. From a functional point of view, it is then important to notice that the panels are provided with an appropriately profiled edge, so that any breaking or rupture that might possibly occur in use, would develop at the base thereof, and along a vertical section, so as to avoid any projection or prominence of the edge with respect to the plane of the floor.

These and further aims are reached in a floor covering according to the present invention which is essentially characterized in that the corresponding longitudinal edges of two contiguous panels are associated with each other by overlapping and engage each other without any interference along at least a vertical plane, so as to bring about a self-levelling and self-stabilizing connection under load, with the possibility for the edges to longitudinally slide relative to each other.

Anyway, features and advantages of the present invention will be more readily and clearly understood from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is an interrupted cross-sectional view of a panel according to the present invention;

- Figure 2 is a partial cross-sectional view of the longitudinal edges of two panels in the phase in which the respective side profiles engage each other;

- Figure 3 is a partial cross-sectional view of the longitudinal edges of the two panels of Figure 2 in their fully engaged condition;

- Figures 4 to 6 are partial cross-sectional views of the longitudinal edges of the two panels of Figure 3 under different load conditions;

- Figure 7 is an interrupted longitudinal sectional view of the panel of Figure 1;

- Figure 8 is a partial cross-sectional view of the butt sides of two contiguous panels with their respective profiles fully engaging each other; and

- Figure 9 is a partial perspective view of a floor covering in the phase in which the butt profiles of the panels are assembled.

The present invention refers to a floor covering formed by panels of such a material as MDF, HDF or faced-chipboard, ie. manufactured out of board made of fibers or wooden chips impregnated with synthetic resins and faced on their surfaces with either natural or synthetic materials. These panels may have different shapes and dimensions, but they are usually rectangular and are joined with each other along all of their perimetral edges.

According to the present invention, a panel 10 (Fig. 1) has, on two opposite sides thereof, a section with conjugate profiles, so that two contiguous panels will then be able to join with each other along engagement surfaces that are orthogonal with respect to each other. In fact, on one side, the cross-sectional profile of the panel 10 can be noticed to include a portion 11 which has a reduced height with respect to the overall height of the panel and extends horizontally along the same

plane as the upper plane of the panel. This portion 11 further extends downwards, thereby forming a laterally protruding rib 12 which, in a preferred manner, is interrupted at one or more points, ie. along one or more tracts, along its overall extension. Moreover, the portion 11 has on its lower side a plane horizontal surface 13 and a recess 14, the bottom of which is also plane and substantially horizontal. The surface 13 and the recess 14 are connected by a tract of inclined surface 15.

The the other, ie. opposite side of the panel 10 has in turn a portion 16 which has again a reduced height with respect to the overall height of the panel and extends horizontally along the same plane as the lower surface of the panel. The portion 16 further extends upwards with a rib 17 which extends all along the side of the panel and whose upper surface 18 is substantially horizontal. The portion 16 has furthermore a horizontal plane surface 19 at a lower level than the level of the surface 18 and connected to the latter through a vertical groove 20 opening upwards. At the end portion of the surface 19 on the opposite side of the groove 20, the side of the panel is provided with a recess 21. A particular importance, as this will be more clearly explained further on, has to be tributed to the groove 20, which is deeply hollowed out, ie. sunken so that the thickness of the panel, as seen across the vertical section thereof, turns out to be considerably reduced with respect to the overall thickness of the panel itself. The groove 20 forms a balanced union joint specially adapted to lead towards the floor, underneath the neutral axis of the panel, the strains induced by expansions which the panel itself may undergo in use, thereby maintaining the coplanarity of the treading surface. The minimum section of the panel under the groove 20 shall at most be equal to one fourth of the overall thickness of the panel.

Figure 2 is a partial cross-sectional view of the longitudinal sides of two panels 10 in the phase in which the respective profiles thereof are mutually engaging. As it can be seen, the panel that has to be inserted (the one shown on the right side of the Figure) is drawn in an inclined position alongside the already arranged matching panel, while the insertion is made by simply rotating the edge portion 11 of the panel to be inserted with respect to the edge portion 16 of the matching panel already arranged in position. The rib 12 and the corresponding

accomodating seat 21 hereby form the fulcrum about which the rotary motion for assembling and disassembling the panels is performed. The upper resting plane between the rib 12 and its seat 21 must be horizontal and positioned very close to or coinciding with the neutral axis of the cross-section of the panel. The insertion is facilitated by the fact that the vertical engagement profiles of the two panels are "relieved", ie. slightly beveled in order to prevent them from mutually interfering when they are coupled together and enter into contact with each other.

Figure 3 is a partial cross-sectional view of the detail shown in Figure 2, however in the phase in which the engagement, ie. coupling between the two contiguous panels has been completed. It should be noticed that the panels turn out to be simply resting on each other along a horizontal plane on which the lower surface 13 of the portion 11 of a panel (ie. the one shown in the left side of the Figure) and the upper surface 19 of the portion 16 of the other panel (ie. the one shown on the right side of the Figure)come to meet with each other. The rib 12 engages the recess 21, and the rib 17 in turn engages the recess 14, in a loose manner since they only serve a locating and retaining purpose when positioning and assembling the panels. Since the edges of the panels are not joined to each other by any kind of forced coupling, but taking merely advantage of the elasticity of the materials, it clearly emerges that two contiguous panels are in this manner capable of freely sliding with respect to each other, thereby facilitating the assembly as well as the butt joining of contiguous panels.

As the afore cited Figure 3, Figures 4 to 6 illustrate the detail of the longitudinal coupling of two panels with each other under differing conditions of load applied to the floor.

In particular, Figure 4 illustrates the case in which a force F, applied to the upper end portion of the panel on the right side of the Figure, triggers a reaction R of the slab under the floor, wherein said reaction is transmitted through the mutual contact surfaces along the path indicated by the arrows inside the panels. In a fully similar manner can be noticed to behave the two so engaged panels when the force F is applied on to the upper end portion of the panel on the left-hand side in

Figure 5. Finally, when both upper end portions of the two panels are loaded with a force F, as shown in Figure 6, the reaction R of the slab under the floor is transmitted inside the panels where it balances at the vertical contact surfaces.

Figure 7 is an interrupted longitudinal-section view of the panel illustrated in Figure 1, while Figure 8 is a partial sectional view of the butt sides of two contiguous panels 10 with the respective profiles in a fully engaged condition. A panel (ie. the one on the left-hand side of the Figure) is provided with an extension 30, which is aligned with the lower surface of the same panel and whose profile, when seen across its section, features a resting and reference plane 31, as well as a groove 32, which follows a sunken contour with respect to, ie. is lower than the plane 31, and a hook-like end portion 33.

Correspondingly, the other panel (ie. the one on the right-hand side of the Figure) has an extension 34 aligned with the upper surface of the same panel, whose profile features a resting and reference plane 35 and a hook-like appendix 36. The planes 31 and 35 can be noticed to be mutually coupled by simply resting on each other when the two panels are assembled, while the hook-like end portions 33 and 36 engage each other.

Figure 9 is a partial perspective view the positioning phase for the butt assembly of the panels of Figure 8. As it can be seen, the assembly is carried out by bringing the longitudinal edge of a panel 10 to rest, according to the arrow A, on the corresponding edges of the contiguous panels, while bringing the butt edges 37 and 38 of the panels to be assembled into mutual contact. Then, the panel 10 is rotated according to the arrow B, while causing, with a scissor-like motion according to a vertical plane, the edge 37 to close against the edge 38, until the panel 10 is fully coplanar with the contiguous panels.

It clearly emerges that all panels have the same form, with two adjacent edges having a "male" profile and the other two adjacent edges having a "female" profile, as shown in Figures 1 and 7. From the same Figures it can be further noticed that contiguous panels are coupled by both mutual support 13, 19 and 31,

35 and double-hook coupling 14, 17 and 33, 36, respectively, however without being in a tension state. Both the assembly and the disassembly of the panels are thereby facilitated, without any need for tools of any kind to be used, along with the adaptation to possible settlings of the plane on which the flooring rests.

As a result, the floor covering according to the present invention, as obtained by assembling panels having the afore described profile and coupled together by simply rotating and laying them down to rest on each other, without any forced engagement of the edges, is self-levelling and self-stabilizing under load conditions.

In prior-art floor coverings, and particularly in floor coverings of the kind described in WO 97/47834, possible breakages, due to coupling edges being put under tension both during assembly and in practical use, occur inside the body of the panel and and tend to develop in a horizontal direction, with the practical result of the edges of the panels becoming exposed both at the lower surface and the upper surface thereof. While such an edge exposure at the lower surface is generally not critical in itself, since it is absorbed by the layer of elastic material arranged between the flooring and the slab therebeneath, the upper edge exposure is on the contrary very annoying, since it causes people to stumble and the flooring itself to incur damages.

These drawbacks are done away with in the floor covering according to the present invention, as it can be easily inferred from the above description and the accompanying Figures. The advantage derives mainly from the non-forced coupling along the horizontal plane of the panels. Furthermore, in correspondence of the grooves 20 and 32 in the lower extension portions 16 and 30 of each panel 10, zones are formed which have a lower strength than the main panel body owing to the reduced cross-section size. Therefore, even in the case that a panel eventually suffers an accidental breakage, the latter would occur in correspondence of the groove 20 and/or the groove 32 and would further develop in a vertical direction without involving the central portion of the panel. As a result,

the resulting damage would only be limited in its extent and would not be transferred on to the upper surface of the panel.

CLAIMS

1. Floor covering formed by panels constituted by boards of cellulose fibers or wood shavings bound with synthetic resins, generally known as MDF, HDF, or faced chipboard, which are peripherally provided with longitudinal and butt edges that have appropriately shaped profiles to enable them to mutually and firmly couple so as to prevent the same edges from drifting apart, characterized in that the corresponding longitudinal and butt edges of two contiguous panels (10) are coupled by simple rotation and overlapping according to horizontal planes (13, 19; 31, 35) and engage each other by means of a double-hook engagement (14, 17; 33, 36) according to substantially vertical planes, so as to form a loose joint that is capable of self-levelling and self-stabilizing under load conditions (F), with the edges being capable of longitudinally sliding with respect to each other.

2. Floor covering formed by panels according to claim 1, characterized in that each panel (10) has one of the longitudinal edges thereof provided with a portion (11), which is protruding laterally and coplanar with the upper surface of the panel, and the other one of the longitudinal edges thereof, on the opposite side of the afore cited one, provided with a portion (16) which is protruding laterally and coplanar with the lower surface of the panel, respective horizontal plane surfaces (13, 19) being provided on said portions to rest on corresponding surfaces of the contiguous panel.

3. Floor covering formed by panels according to claim 1 or 2, characterized in that each panel (10) is provided with a vertical recess (14) on a longitudinal edge thereof, and a horizontal recess (21) on the opposite longitudinal edge thereof,

said recesses being adapted to accomodate respective ribs (17, 12) of contiguous panels.

4. Floor covering formed by panels according to any of the preceding claims 1 to 3, characterized in that the portion (16) extending laterally from each panel (10) is provided with a vertical groove (20) opening upwards, in correspondence of which the panel is provided with a lower-strength section.

5. Floor covering formed by panels according to any of the preceding claims 1 to 4, characterized in that each panel (10) has on one of the butt edges thereof an extension (30), which is aligned with the lower surface of the same panel and whose cross-sectional profile shows a resting and reference plane (31), as well as a groove (32), which is sunken with respect to the plane (31), and a hook-like end portion (33), whereas on the opposite butt edge it has an extension (34), which is aligned with the upper surface of the same panel and whose profile shows a reference and resting plane (35) and a hook-like appendix (36).

6. Method for the assembly of a floor covering formed by a plurality of panels constituted by boards of cellulose fibers or wood shavings bound with synthetic resins, generally known as MDF, HDF, or faced chipboard, characterized in that the corresponding longitudinal edges of contiguous panels (10) are joined together by simple rotation and overlapping thereof according to horizontal planes (13, 19; 31, 35), whereas the corresponding butt edges of contiguous panels are coupled by a double-hook engagement (14, 17; 33, 36) according to substantially vertical planes, the longitudinal edges being coupled so as to be capable of freely sliding relative to each other.

7. Method for the assembly of a floor covering according to claim 6, characterized in that the contiguous panels (10) are coupled together by loosely engaging each other, so as to enable them to be assembled and disassembled by a mutual rotation of the butt edges and the side edges, thereby making it possible for the same panels to be reused.

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/EP 99/09390

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04F15/04 E04F15/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 97 47834 A (UNILIN BEHEER BV) 18 December 1997 (1997-12-18) cited in the application page 9, line 26 -page 14, line 11 page 19, line 31 -page 28, line 3; figures 1-7,22-25	1,2
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[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
28 March 2000	04/04/2000

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

Inte onal Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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Information on patent family members

Intl. Appl. No. PCT/EP 99/09390

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